

Patent
10/784,516

REMARKS

Claims 21-32 are pending in the application. Claim 21 is the only independent claim and has been amended herein.

Double Patenting

The Action noted under the heading of "Double Patenting", that "Claims 21-22, 24-27 and 31 directed to the same invention as that of claims 18-19, 21-25 of commonly assigned 2004/0110333, 10/724849".

Applicants respectfully *traverse* this assertion, noting that independent Claim 21 of the present application recites, in part, "at least one doped column having a dopant of a second conductivity type, said column being formed from a dopant introduced into both sidewall and bottom surfaces of the trench by an etchant gas used to form the trench, and the dopant being diffused into the epitaxial layer" – while independent Claim 18 of 2004/0110333 recites, "at least one doped column having a dopant of a second conductivity type, said column being formed from a plurality of doped layers diffused into one another, said doped layers being located in said epitaxial layer adjacent a sidewall of said trench and arranged vertically one over the other".

Thus, the present application has a uniform dopant profile in the direction perpendicular to the trench wall, while the 2004/0110333 application has a dopant profile that varies along the depth of the trench in a generally regular, repeating fashion.

Reconsideration and withdrawal of this double patenting assertion are therefore respectfully requested.

Section 102(e) and 103(a)

Claims 21-27, 31 and 32 were rejected under 35 USC 102(e) as being anticipated by US Patent 6,465,304 (Blanchard). Dependent Claims 28-30 were rejected under 35 USC 103(a) as being unpatentable over Blanchard '304 in view of 4,735,633 (Chiu). Each of the rejections is respectfully traversed and reconsideration is requested.

Patent
10/784,516

Independent Claim 21, as amended herein, is directed to a power semiconductor device including a substrate of a first or second conductivity type, a voltage sustaining region disposed on said substrate, the voltage sustaining region including an epitaxial layer having a first conductivity type, at least one trench located in the epitaxial layer, and at least one doped column having a dopant of a second conductivity type, the column being formed from a dopant introduced *into both sidewalls and bottom surfaces of the trench* by an etchant gas used to form the trench, and *the dopant being diffused into the epitaxial layer*. A filler material substantially fills the trench and at least one region of the second conductivity disposed over the voltage sustaining region to define a junction therebetween.

As described in paragraphs [0025] and [0026] of the pending application, together with FIGs. 4(a) and 4(b), a power semiconductor device according to Claim 21 includes at least one doped column having a dopant of a second conductivity type, *said column being formed from a dopant introduced into surfaces of the trench by an etchant gas used to form the trench and which is diffused into the epitaxial layer* – Blanchard '304 fails to teach or suggest such a device.

Rather, Blanchard '304 forms floating islands of dopant having an annular shape by implanting into the bottom of each trench before removing the silicon beneath the center of the trench bottom. Therefore, the device recited in independent Claim 21 is not taught or suggested by the technique described in Blanchard '304.

Regarding the rejection of Claims 28-30 under 35 U.S.C. §103(a) in view of Blanchard '304 and Chiu, it is noted that the assignee of Blanchard '304, and the assignee of the present application, are one and the same (i.e., General Semiconductor). 35 U.S.C. § 103(c) reads as follows: "Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (c), (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person." As noted in the Action, Blanchard '304 "constitutes prior art only under 35 USC 102(e)".


Patent
10/784,516

Statement concerning common ownership

In this connection, and in compliance with M.P.E.P. 706.02(1)(2), it is submitted that currently pending Application No. 10/784,516, and US Patent 6,465,304 (Application No. 09/970,972), were, at the time the invention of Application No. 10/784,516 was made, owned by General Semiconductor or subject to an obligation of assignment to General Semiconductor.

The application is believed to be in condition for allowance. Should the Examiner be of the view that an interview would expedite consideration of the application, request is made that the Examiner telephone the Applicant's attorney at (908) 518-7700 in order that any outstanding issues be resolved.

Respectfully submitted,



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